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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/987,683	11/15/2001	Mark Henry Shipton	111129	7535

25944 7590 02/04/2003

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EXAMINER

WILKINS III, HARRY D

ART UNIT	PAPER NUMBER
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1742

DATE MAILED: 02/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/987,683

Applicant(s)

SHIPTON ET AL.

Examiner

Harry D Wilkins, III

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5,6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

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**DETAILED ACTION*****Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Darolia et al (US 6,444,057) in view of Naik et al (US 5,077,141).

Darolia et al teach the invention substantially as claimed. Darolia et al teach (see paragraph spanning cols. 1 and 2) a composition which compares with the presently claimed composition as follows:

(All in wt%)	Claimed	Darolia et al	Comparison
Cr	4-8	1-10	Prior Art is broader
Al	5-6.5	5-7	Overlap at 5-6.5
Co	2-6	4-20	Overlap at 4-6
Ta	4-8	4-12	Overlap at 4-8
Re	3-5	0-8	Prior Art is broader
Hf	0.1-0.5	0.2-2.0	Overlap at 0.2-0.5
C	0.04-0.1	0-0.1	Overlap at 0.04-0.1
Si	0.05-0.3	Not intentionally added	
B	0.003-0.01	0-0.01	Overlap at 0.003-0.01
W	(<5)	3-8	
Pt	(<5)		
La	(0.003-0.008)		
Y	(0.003-0.008)	0-0.1	
Others		0-2 Mo, 0-2 Ti, 0-6 Ru, 0-1 Nb	

It would have been within the expected skill of a routineer in the art to have optimized the composition of Cr and Re in the alloy Darolia et al in order to achieve proper

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oxidation and corrosion resistance from Cr and sufficient strength from Re (for support see Duhl et al at col 2, lines 50-54 and Naik et al at paragraph spanning cols 5 and 6).

Darolia et al teach (see col 4, lines 51-60) that Si is not intentionally added because in order to properly affect the composition, too much would have to be added to achieve the improved mechanical properties (see col 2, lines 14-26). Thus, too much Si (i.e.-enough to affect properties such as castability) would have to be added to achieve an increase in the mechanical properties of the alloy.

However, Naik et al teach (see abstract and col 5, lines 46-56) that 0.02-1.0 wt% of Si is added to a Ni-base alloy for improving the oxidation and corrosion resistance of the alloy, without the formation of excessive quantities of low melting compounds. This teaching is compatible with the teaching of Darolia et al because the increase in chemical properties provided by Si would not affect the mechanical properties of the alloy of Darolia et al.

Therefore, it would have been obvious to one of ordinary skill in the art to have added 0.02-1.0 wt% of Si as taught by Naik et al to the alloy of Darolia et al for the known purpose of improving oxidation and corrosion resistance.

Regarding claims 2 and 3, the alloy of Darolia et al may contain further elements, such as Mo, Ti and Nb; however, as each of the ranges for these elements includes zero, they may be omitted (i.e.-are substantially excluded).

Regarding claim 4, the alloy of Darolia et al further contains 3-8 wt% W and 0-0.1 wt% Y. It would have been within the expected skill of a routineer in the art to have

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optimized the content of Y in order to maximize the added oxidation resistance (for support see Naik et al at col 6, lines 30-36).

Regarding claim 5, Darolia et al in view of Naik et al teach an alloy which consists essentially of Cr, Al, Co, Ta, Re, Hf, C, Si, B, W and Y, with the balance Ni.

Regarding claim 6, the values for Cr, Al, Co, Ta, Re, C, Si, B and Y fall within the disclosed range of Darolia et al in view of Naik et al. It would have been within the expected skill of a routineer in the art to have optimized the composition in order to maximize the chemical and mechanical properties of the alloy. The value of Hf is just outside the range disclosed by Darolia et al, and is close enough (0.15 wt% vs. 0.20 wt%) that one of ordinary skill in the art would have expected that the two values would yield the same properties. See MPEP 2144.05. The value of W is outside of the range disclosed by Darolia et al. No function is attributed to W by Darolia et al. It was well known in the art that W could provide sufficient strength in Ni-based alloys even when added at as little as 2 wt% (for support, see Sato et al at col 9, lines 1-3). Therefore, it would have been obvious to one of ordinary skill in the art to have reduced the amount of W in the alloy of Darolia et al because sufficient strength can still be maintained at only 2 wt%. Darolia et al fail to teach adding 0.003-0.005 wt% La to the alloy. Naik et al teach col 6, lines 30-36) that La, provides improved oxidation resistance in combination with Y. Therefore, it would have been obvious to one of ordinary skill in the art to have added La as taught by Naik et al to the alloy of Darolia et al and to have optimized the amount added to maximize the oxidation resistance.

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3. Claims 7 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Darolia et al (US 6,444,057) in view of Naik et al (US 5,077,141) as applied to claims 1-6 above, and further in view of Schell et al (US 5,622,638) and Applicant's admission of prior art.

The teachings of Darolia et al in view of Naik et al are described above in paragraph no. 2.

Darolia et al in view of Naik et al do not teach a method for forming a blade tip of a gas turbine comprising applying the nickel composition to the tip of a gas turbine blade.

Schell et al teach (see abstract) teach a method of applying a nickel alloy composition to the tip of a gas turbine blade.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the alloy of Darolia et al in view of Naik et al for the conventional use of a blade tip on a turbine blade as taught by Schell et al because the alloy of Darolia et al has improved mechanical properties (see col 1, lines 54-57).

Regarding claim 11, Applicant admits as prior art (see page 1) that laser deposition (cladding) is a known method applicable to the method of Schell et al.

Regarding claim 12, Schell et al teach (see claims 1, 7, 8 and 9) a method that includes laser depositing a Ni alloy to the tip of a gas turbine blade to a near-net shape followed by machining to achieve the final shape.

Regarding claim 13, Schell et al teach (see claim 9) that the deposition is applied by a laser fusing process.

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Regarding claim 14, Applicant admits as prior art (see page 1) that a conventional blade tip addition is a squealer.

4. Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Darolia et al (US 6,444,057) in view of Naik et al (US 5,077,141) as applied to claims 1-6 above, and further in view of Mukira et al (US 6,468,367).

The teachings of Darolia et al in view of Naik et al are described above in paragraph no. 2.

Darolia et al in view of Naik et al do not teach a method of repairing a gas turbine blade comprising applying the nickel composition to a damaged portion of the gas turbine blade.

Mukira et al teach (see col 1, lines 20-35) that it is common in the art to apply a repair alloy (Ni based weld wire) to a damaged turbine blade by a tungsten arc welding process to repair the blade.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the alloy of Darolia et al in view of Naik et al for the conventional repairing method as taught by Mukira et al because the alloy of Darolia et al has improved mechanical properties (see col 1, lines 54-57).

Regarding claims 9 and 10, Mukira et al teach (see col 1, lines 20-35) that the article is a Ni alloy turbine blade.

5. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wukusick et al (GB 2,235,697) in view of Naik et al (US 5,077,141).

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Wukusick et al teach the invention substantially as claimed. Wukusick et al teach (see paragraph Table 1, page 3) a composition which compares with the presently claimed composition as follows:

(All in wt%)	Claimed	Wukusick et al	Comparison
Cr	4-8	5-10	Overlap at 5-8
Al	5-6.5	5-7 (6.2 most preferred)	Overlap at 5-6.5
Co	2-6	5-10	Overlap at 5-6
Ta	4-8	3-8	Overlap at 4-8
Re	3-5	0-6 (3 most preferred)	Prior Art is broader
Hf	0.1-0.5	0-0.5 (0.15 most preferred)	Overlap at 0.1-0.5
C	0.04-0.1	0-0.07 (0.05 most preferred)	Overlap at 0.04-0.07
Si	0.05-0.3	Not intentionally added	
B	0.003-0.01	0-0.015 (0.004 most preferred)	Prior Art is broader
W	(<5)	3-10	
Pt	(<5)		
La	(0.003-0.008)		
Y	(0.003-0.008)	0-0.075	
Others		0-2 Mo, 0-2 Ti	

It would have been within the expected skill of a routineer in the art to have optimized the composition of Re and B in the alloy Wukusick et al in order to achieve sufficient strength from Re and grain boundary strengthening from B (for support see Naik et al at paragraph spanning cols 5 and 6 and Hino et al paragraph 39).

Wukusick et al are silent on the content of Si.

However, Naik et al teach (see abstract and col 5, lines 46-56) that 0.02-1.0 wt% of Si is added to a Ni-base alloy for improving the oxidation and corrosion resistance of the alloy, without the formation of excessive quantities of low melting compounds.

Therefore, it would have been obvious to one of ordinary skill in the art to have added 0.02-1.0 wt% of Si as taught by Naik et al to the alloy of Wukusick et al for the known purpose of improving oxidation and corrosion resistance.



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Regarding claims 2 and 3, the alloy of Wukusick et al may contain further elements, such as Mo and Ti; however, as each of the ranges for these elements includes zero, they may be omitted (i.e.-are substantially excluded).

Regarding claim 4, the alloy of Wukusick et al further contains 3-8 wt% W and 0-0.075 wt% Y. It would have been within the expected skill of a routineer in the art to have optimized the content of Y in order to maximize the added oxidation resistance (for support see Naik et al at col 6, lines 30-36).

Regarding claim 5, Wukusick et al in view of Naik et al teach an alloy which consists essentially of Cr, Al, Co, Ta, Re, Hf, C, Si, B, W and Y, with the balance Ni.

Regarding claim 6, the values for Al, Ta, Re, C, Si, B and Y fall within the disclosed range of Wukusick et al in view of Naik et al. It would have been within the expected skill of a routineer in the art to have optimized the composition in order to maximize the chemical and mechanical properties of the alloy. The values of Cr and Co are just outside the ranges disclosed by Wukusick et al, and are close enough (4.5 wt% vs. 5.0 wt% Cr and 4 wt% vs. 5 wt% Co) that one of ordinary skill in the art would have expected that the two values would yield the same properties. See MPEP 2144.05. The value of W is outside of the range disclosed by Wukusick et al. No function is attributed to W by Wukusick et al. It was well known in the art that W could provide sufficient strength in Ni-based alloys even when added at as little as 2 wt% (for support, see Sato et al at col 9, lines 1-3). Therefore, it would have been obvious to one of ordinary skill in the art to have reduced the amount of W in the alloy of Wukusick et al because sufficient strength can still be maintained at only 2 wt%. Darolia et al fail to

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teach adding 0.003-0.005 wt% La to the alloy. Naik et al teach col 6, lines 30-36) that La, provides improved oxidation resistance in combination with Y. Therefore, it would have been obvious to one of ordinary skill in the art to have added La as taught by Naik et al to the alloy of Wukusick et al and to have optimized the amount added to maximize the oxidation resistance.

6. Claims 7 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wukusick et al (GB 2,235,697) in view of Naik et al (US 5,077,141) as applied to claims 1-6 above, and further in view of Schell et al (US 5,622,638) and Applicant's admission of prior art.

The teachings of Wukusick et al in view of Naik et al are described above in paragraph no. 5.

Wukusick et al in view of Naik et al do not teach a method for forming a blade tip of a gas turbine comprising applying the nickel composition to the tip of a gas turbine blade.

Schell et al teach (see abstract) teach a method of applying a nickel alloy composition to the tip of a gas turbine blade.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the alloy of Wukusick et al in view of Naik et al for the conventional use of a blade tip on a turbine blade as taught by Schell et al because the alloy of Wukusick et al has excellent resistance to oxidation and corrosion (see abstract).

Regarding claim 11, Applicant admits as prior art (see page 1) that laser deposition (cladding) is a known method applicable to the method of Schell et al.

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Regarding claim 12, Schell et al teach (see claims 1, 7, 8 and 9) a method that includes laser depositing a Ni alloy to the tip of a gas turbine blade to a near-net shape followed by machining to achieve the final shape.

Regarding claim 13, Schell et al teach (see claim 9) that the deposition is applied by a laser fusing process.

Regarding claim 14, Applicant admits as prior art (see page 1) that a conventional blade tip addition is a squealer.

7. Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wukusick et al (GB 2,235,697) in view of Naik et al (US 5,077,141) as applied to claims 1-6 above, and further in view of Mukira et al (US 6,468,367).

The teachings of Wukusick et al in view of Naik et al are described above in paragraph no. 5.

Wukusick et al in view of Naik et al do not teach a method of repairing a gas turbine blade comprising applying the nickel composition to a damaged portion of the gas turbine blade.

Mukira et al teach (see col 1, lines 20-35) that it is common in the art to apply a repair alloy (Ni based weld wire) to a damaged turbine blade by a tungsten arc welding process to repair the blade.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the alloy of Wukusick et al in view of Naik et al for the conventional repairing method as taught by Mukira et al because the alloy of Wukusick et al has excellent resistance to oxidation and corrosion (see abstract).

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Regarding claims 9 and 10, Mukira et al teach (see col 1, lines 20-35) that the article is a Ni alloy turbine blade.

8. Claims 1 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeBussac et al (FR 2,780,983) in view of Hino et al (US 2002/0062886).

DeBussac et al teach the invention substantially as claimed. DeBussac et al teach (see Derwent abstract) a Ni-based alloy that contains 4.5-6 wt% Cr, 0-10 wt% Co, 3.5-7 wt% Ta, 5-5.6 wt% Al, 0-0.2 wt% Hf, 0-0.2 wt% Si, 2-3.5 wt% Re and the balance Ni. The ranges for Cr, Ta, Al, Re, Hf, Si overlap the presently claimed range. The range of Co is broader than the presently claimed range. However, it would have been within the expected skill of a routineer in the art to have optimized the content of Co for the purpose of strengthening (for support see paragraph 23 of Hino et al).

DeBussac et al fail to teach the content of C or B in the alloy.

Hino et al teach (see paragraphs 38 and 39) that C and B are controlled in Ni-based alloys to less than 0.1 wt% and less than 0.05 wt%, respectively, to add grain boundary strength while avoiding formation of carbides.

Therefore, it would have been obvious to one of ordinary skill in the art to have added C and B, as taught by Hino et al to the alloy of DeBussac et al for the known purpose of grain boundary strengthening.

Regarding claim 4, DeBussac et al teach (see abstract) adding 4.5-7.5 wt% W and 0-0.05 wt% Y.

9. Claims 7 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeBussac et al (FR 2,780,983) in view of Hino et al (US 2002/0062886) as applied

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to claims 1 and 4 above, and further in view of Schell et al (US 5,622,638) and Applicant's admission of prior art.

The teachings of DeBussac et al in view of Hino et al are described above in paragraph no. 8.

DeBussac et al in view of Hino et al do not teach a method for forming a blade tip of a gas turbine comprising applying the nickel composition to the tip of a gas turbine blade.

Schell et al teach (see abstract) teach a method of applying a nickel alloy composition to the tip of a gas turbine blade.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the alloy of DeBussac et al in view of Hino et al for the conventional use of a blade tip on a turbine blade as taught by Schell et al because the alloy of DeBussac et al has high creep resistance (see Derwent abstract).

Regarding claim 11, Applicant admits as prior art (see page 1) that laser deposition (cladding) is a known method applicable to the method of Schell et al.

Regarding claim 12, Schell et al teach (see claims 1, 7, 8 and 9) a method that includes laser depositing a Ni alloy to the tip of a gas turbine blade to a near-net shape followed by machining to achieve the final shape.

Regarding claim 13, Schell et al teach (see claim 9) that the deposition is applied by a laser fusing process.

Regarding claim 14, Applicant admits as prior art (see page 1) that a conventional blade tip addition is a squealer.

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10. Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeBussac et al (FR 2,780,983) in view of Hino et al (US 2002/0062886) as applied to claims 1-6 above, and further in view of Mukira et al (US 6,468,367).

The teachings of DeBussac et al in view of Hino et al are described above in paragraph no. 8.

DeBussac et al in view of Hino et al do not teach a method of repairing a gas turbine blade comprising applying the nickel composition to a damaged portion of the gas turbine blade.

Mukira et al teach (see col 1, lines 20-35) that it is common in the art to apply a repair alloy (Ni based weld wire) to a damaged turbine blade by a tungsten arc welding process to repair the blade.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the alloy of DeBussac et al in view of Hino et al for the conventional repairing method as taught by Mukira et al because the alloy of DeBussac et al has excellent creep strength (see Derwent abstract).

Regarding claims 9 and 10, Mukira et al teach (see col 1, lines 20-35) that the article is a Ni alloy turbine blade.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D Wilkins, III whose telephone number is 703-305-9927. The examiner can normally be reached on M-Th 6:00am-4:30pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V King can be reached on 703-308-1146. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Harry D Wilkins, III  
Examiner  
Art Unit 1742

hdw  
January 23, 2003

ROY KING  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700